Taylor Run Stream Restoration

Watershed	Chesapeake Bay, Potomac River, Cameron Run, Taylor Run
Linear Feet of Stream Restored	**1,900**
Project Cost (Estimated)	**$4.5 million total with $2.255 million from a VDEQ grant**
Project Status	**Survey complete and design process is underway. Design process expected to complete in Fall 2020/Winter 2020 and construction is anticipated to begin Summer 2021/Fall 2021.**

FREQUENTLY ASKED QUESTIONS:

1. **What is the purpose of a Stream Restoration project in Alexandria?**
2. **Why is Taylor Run in need of "restoration"?**
3. **I heard that stream banks at Taylor Run are not eroding. Why fix something that isn't broken?**
4. **Are there wetlands and other sensitive environmental resources impacted by this project?**
5. **What work was done to identify sensitive environmental resources potentially impacted by the work?**
6. **Where does the funding for stream restoration projects come from? Can this money be spent on other things, like schools and affordable housing?**
7. **How will stream restoration projects help meet the City's mandated goals to reduce pollution, especially for the Bay cleanup?**
8. **How does the City measure the success of stream restoration projects?**
9. **How do we know that a stream restoration is not going to do more harm than good?**
10. **What other benefits come from stream restoration, other than meeting the City's pollution reduction goals?**
11. **What are the impacts to trees in the project's disturbed areas; and what is planned for mitigating the loss of existing trees?**
12. **Don't trees and their root systems near streams help hold soil and prevent erosion?**
13. **I heard Taylor Run valley south of Chinquapin Park Rec Center is a pristine natural area. Why would the City choose to disturb this area?**
14. **There have been some criticisms of Natural Channel Design, lately. What is the City's position on the use of Natural Channel Design?**

15. What alternatives has the City considered before making the decision to "restore" Taylor Run?

16. What environmental permits are required for this project?

17. Can the City "restore" streams on private property?

18. Was Recreation, Parks, and Cultural Activities (RPCA) Natural Resources Division (NRD) consulted on these Stream Restoration projects?

19. Shouldn't the City be considering a "Do No Harm" approach to Stream Restoration projects?

20. How long will it take before things grow back?

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1. What is the purpose of a Stream Restoration project in Alexandria?

a. Stream Restoration in Alexandria has several goals and objectives that are dependent upon the specific site conditions found at the stream of interest.

i. In General, the Goals and Objectives include:

- Prevent streambank erosion, to protect properties and infrastructure
- Restore hydrologic function, including dynamic channel processes
- Slow the procession of headcutting in a watershed, to protect upland areas and infrastructure, and to reduce sediment delivery to downstream reaches
- Reduce rates of lateral migration of channel meandering
- Improve water quality, such as nutrients and sediment
- Remove non-native riparian vegetation, replacing with more desirable species
- Establish stream reaches capable of transporting sediment supply
- Provide compliance with Chesapeake Bay requirements, including the reduction of pollutants by reducing erosion
- Reconnect the stream to the floodplain

2. Why is Taylor Run in need of "restoration"?

a. Taylor run is in an advanced stage of degradation:

i. The channel is down-cut such that the stream bank is severely incised (vertical cut) and is over 8-feet deep in places, separating the stream from its natural floodplain

ii. Severe erosion has scoured the channel banks, transporting sediment and associated pollutants downstream

iii. Previous attempts to slow the stream and prevent further erosion included dumping recycled broken pieces of concrete curb, gutter, and sidewalk into the stream channel. This not only failed as a practice, but may have made things worse over time

iv. Erosion of the stream banks and downcutting of the channel bottom has exposed the sanitary sewer pipes that cross the stream in several places and threatens the structural integrity of that infrastructure

3. I heard that stream banks at Taylor Run are not eroding. Why fix something that isn't broken?

a. There is ample evidence that the stream banks have experienced severe erosion, mostly during high-flow events. Smaller storms don't erode much, but the bigger storms cause the severe damaging erosion. Fallen trees across the stream and newly exposed tree roots are some examples of recent active erosion during these high-flow flood events. See photos below:

4. **Are there wetlands and other sensitive environmental resources impacted by this project?**
    a. Yes, there are wetlands nearby. No, they are not impacted. The delineated wetlands are located outside the disturbed area for the project. They are also up-hill from the work area, so any runoff from disturbed areas will not be draining into the wetlands.

5. **What work was done to identify sensitive environmental resources potentially impacted by the work?**
    a. The City, as well as any other property owner, is required to apply for environmental permits for stream work. The process in Virginia is through a Joint Permit Application (JPA), managed by Virginia Marine Resources Commission (VMRC), that conveys permit requests to Virginia Department of Environmental Quality (VA DEQ) and the US Army Corps of Engineers (USACE). As part of any Stream Restoration project in Alexandria, our consulting teams are also required by the City to do an environmental site assessment before we plan to do any work. Before the limits of disturbance were determined, staff and the consulting team met with RPCA Natural Resources Division staff and did a walkthrough of the site. RPCA staff pointed out wetland features that would need to be protected. Our consultant's staff, specializing and certified in delineation of streams and wetlands, conducted a survey to locate all sensitive areas in and near the work area. Potential impacts were assessed, and the limits of disturbance was adjusted to minimize unnecessary impacts. All the wetlands were excluded from the disturbed area and will not be impacted.

6. **Where does the funding for stream restoration projects come from? Can this money be spent on other things, like schools and affordable housing?**
    a. The Stream Restoration projects at Taylor Run, Strawberry Run, and Lucky Run are partially funded (50%) by the Virginia State and Local Assistance Fund (SLAF) reimbursement grants. The remaining funding is through the Stormwater Utility Fee and Stormwater ½-cent property tax. This funding may only be spent on stormwater related projects.

7. **How will stream restoration projects help meet the City's mandated goals to reduce pollution, especially for the Bay cleanup?**
    a. See the Taylor Run Stream Restoration Fact Sheet for more details: https://www.alexandriava.gov/uploadedFiles/tes/Stormwater/TaylorRunStreamRestorationWinter20192020.pdf

8. **How does the City measure the success of stream restoration projects?**
    a. Successful Stream Restoration projects in Alexandria will demonstrate:
        i. Stable banks and channel (reduced erosion)
        ii. Protection of private property and city infrastructure (sanitary & storm sewers)
        iii. Reconnection to the floodplain
        iv. Invasive non-native plants removed, and native plants re-established
        v. Compliance with regulatory mandates for pollution reduction

9. **How do we know that a stream restoration is not going to do more harm than good?**
    a. The City of Alexandria has only a handful of remaining stream corridors. Most of the city's streams have been severely disturbed in the past, either for relocating and/or restricting the stream width to make room for subdivisions and roads, or have had sanitary sewers installed along side, across and through them. Increased urbanization that occurred in the 50's, 60's and 70's has put tremendous stress on these open channel drainage systems to continue to function as a healthy stream. Now, with an increase in frequency of high-flow storm events, these streams are eroding and threaten many older trees along and near their banks. If nothing happens to improve the resiliency of the city's streams, additional tree loss and erosion of the banks will continue to degrade these waterways. Improving the foundations of these streams, by using Natural Channel Design (NCD) and introducing grade control (fall), bank stabilization, reconnection to the floodplain, and riparian plantings of native species will provide a foundation for future natural rebound in an urban watershed. The damage has already been done. What we do now will determine the future of these stream corridors as resilient, or continued degradation.

10. What other benefits come from stream restoration, other than meeting the City's pollution reduction goals?

a. Alexandria's streams are remnants of their former selves, lacking the capacity and structure for stability in a changing climate connected to ultra-urban watersheds. Other benefits include:
    i. Stable channel and banks, reducing erosion during high-flow storm events
    ii. Removal of non-native invasive plants and plantings of thousands of native trees and shrubs
    iii. Reconnecting the stream to the floodplain
    iv. Reducing the high vertical banks to allow safer access to the stream
    v. Building a foundation of resiliency to future storm events allowing quicker natural rebound
    vi. Removal of broken concrete rubble from the stream and excessive angular rip rap

11. What are the impacts to trees in the project's disturbed areas; and what is planned for mitigating the loss of existing trees?

This project employed a strategy of cataloging all the trees in the proposed work area and assessing the impacts to all the surveyed trees. Below is a breakdown of the numbers of affected trees. All trees in the project area above 6" caliper were surveyed for location, type, and health. Each tree was scored for health using the following scale:

1. Tree is in excellent condition and requires little to no management/treatment
2. Tree is in good condition and could use minor management/treatment
3. Tree is stressed and requires significant management/treatment
4. Tree is in serious decline or dead

The sizes of the impacted trees on the site look like this:

208 small (~6-17")
55 med (18-30")
6 large (30+")

Tree Impacts

		Location
Total Trees Surveyed	750	Overall Project
Total Impacted	269	Within the limits of disturbance (LOD)
Dead Trees Impacted	61	Within LOD
Live Trees Impacted	208	Within the LOD
Live Trees Impacted	124	Within Top of Stream Bank[1]
Live Trees Impacted	84	Within Access Road[2]

1. *In jeopardy of dying if stream not restored and allowed to continue to degrade. Evident from the many trees that have already fallen into the stream*
2. *Existing sanitary sewer infrastructure easement, and regrading and stockpile area. Trees are not desirable within a sanitary sewer infrastructure easement, as root growth can damage the pipe infrastructure and affect service delivery.*

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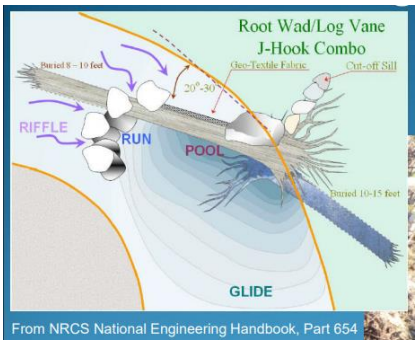
There are 124 live trees (about 60%) located within top of bank of the stream in jeopardy of dying if the stream is not restored and allowed to continue to degrade. This process continues and is evident from the many trees that have already fallen into the stream.

There are 84 live trees (about 40%) within the proposed access road, the existing sanitary sewer infrastructure easement, proposed regrading, and stockpile area.

Note: Trees are not desirable within a sanitary sewer infrastructure easement, as root growth can damage the pipe infrastructure and affect service delivery. If the sanitary sewer is damaged by erosion, raw sewage may enter the stream.

It is the intent of this project to re-use many of the trees taken down as part of the foundation for restoration. They can be used in building log vanes, such as the example below from the US Natural Resources Conservation Service (NRCS) show in their National Engineering Handbook. The current design has multiple log vanes planned for construction as part of the restoration of Taylor Run and Strawberry Run.



12. Don’t trees and their root systems near streams help hold soil and prevent erosion?

a. Yes, that is true, to a point. Streams that erode and scour out beneath the shallow root systems of Alexandria’s trees undermine their root balls and they fall into the stream and die. See photos of Taylor Run below:

13. I heard Taylor Run valley south of Chinquapin Park Rec Center is a pristine natural area. Why would the City choose to disturb this area?

a. This remaining open channel section of Taylor Run, south of Chinquapin Park Rec Center was a small channel until development upstream began to influence concentrated runoff sometime after 1927. Before then, Taylor Run was connected to a wide valley of braided channels and floodplain. By 1937, the corridor that once had agriculture and multiple crisscrossing trails was largely abandoned to the floodplain. Then developments came in before 1947 that piped the runoff into what we see today where the 72" pipe opens into a new constructed channel and clearing of the corridor to allow for fill to be placed west of the channel for a residential development and to the east for a wider King Street, including storm sewer connections. Also, this is when the sanitary sewer was installed through the stream corridor. Then sometime before 1959, the First Baptist Church development added fill, pushing the stream channel to the west approximately 100-feet.

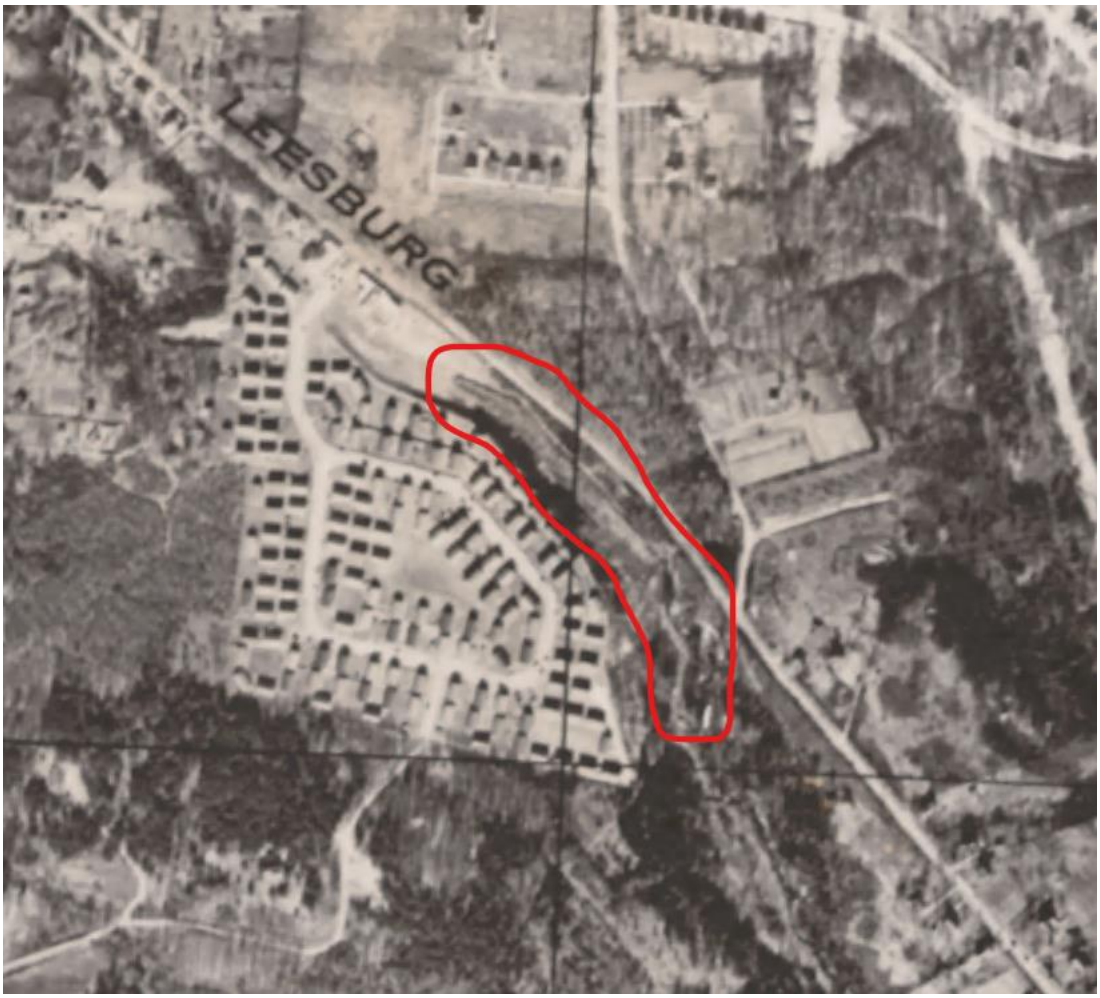
   In fact, Taylor Run was only recently a channelized stream and south of the Chinquapin Park Rec Center and up to the First Baptist Church driveway culverts, it has been in a constructed channel since about 1945. The return to a natural system in the park is a testament to the resiliency of nature. A resiliency that has failed due to continued urbanization and a changing climate. See the following aerial photos:

   Note: The blue line is today's flow-line of Taylor Run.

1927

1937

1945 (US Library of Congress https://hdl.loc.gov/loc.gmd/g3884a.ct009287)



1949

1959

14. There have been some criticisms of Natural Channel Design, lately. What is the City's position on the use of Natural Channel Design?

a. Stream Restoration in general, is described as the work conducted to improve the environmental health of a degraded river or stream, in support of goals and objectives for the waterway. The term Natural Channel Design (NCD) is the toolbox of form-based and process-based restoration techniques that mimic natural conditions and promotes positive natural processes found in healthy streams. The use of NCD techniques is criticized for use in areas where their implementation may or may not meet goals and objectives stated for the stream restoration projects. An example of this is a claim that form-based techniques will remove pollutants from the water as it moves through the restored section of stream. Or, that benthic invertebrates will increase in numbers in a restored section of stream using form-based techniques, e.g.: Riffles, log vanes, etc.

b. The reasons the above examples are appropriately criticized are:
    i. Stabilization techniques (form-based) prevent the erosion and transport of sediment from the restored section of stream to downstream and has some immediate effect on the water quality entering the restored section from upstream but it is a first step and not guaranteed. Stabilized systems, post restoration, can provide a foundation for beneficial aquatic plants to establish that may have more impacts to water quality, as the system finds equilibrium and matures. However, this occurs most effectively in a stabilized stream.
    ii. Providing a physical environment, or habitat, is one aspect of improved conditions necessary to the return of diverse benthic fauna. However, improving habitat does not guarantee an improvement in benthic diversity and population. Studies have shown that the water quality entering the restored stream section from the watershed has a strong influence on a robust and diverse community of aquatic organisms.

c. The City's use of NCD includes both form-based and process-based techniques to meet specific goals of the restoration projects, which include:
    i. Stable banks and channel (reduced erosion)
    ii. Protection of private property and city infrastructure (sanitary & storm sewers)
    iii. Reconnection to the floodplain
    iv. Invasive non-native plants removed, and native plants re-established
    v. Compliance with regulatory mandates for pollution reduction

    For more information on the state of Stream Restoration science and implementation in the US, the USDA Forest Service National Stream & Aquatic Ecology Center publishes periodic Technical Notes and just published their latest update to the "Guidance for Stream Restoration", authored by Steven Yochum and Lindsay Reynolds. <link: https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/YochumReynolds_2020_TN-102-5_GuidanceStreamRestoration-508.pdf>

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    Other resources:
    https://chesapeakestormwater.net/

https://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/MS4Permits.aspx

Below are some examples of form-based techniques for Stream Restoration using NCD:

RIFFLE

STEP-POOL

LOG VANE

CASCADE

15. What alternatives has the City considered before making the decision to "restore" Taylor Run?

a. The City started a Stream Assessment program back in 2004. Since then, there have been two additional studies, the final one, Phase III completed in 2018, evaluated five potential locations for stream restoration. Two were selected for projects: Strawberry Run and Taylor Run.

Criteria for selection from the study is finalized in the matrix for viewing here: https://www.alexandriava.gov/uploadedFiles/tes/Stormwater/AlexandriaRankingMatrixFINAL20181004.pdf

b. A major goal or objective for Stream Restoration in Alexandria is to meet state mandated pollution reduction requirements by reducing stream bank erosion, using Natural Channel Design (NCD) techniques. Taylor Run Stream Restoration, as we are planning to implement, will net a 30% reduction in Phosphorous at a cost of less than $16,000.00 per pound. If the City does not pursue the current urban stream restoration projects, then alternative stormwater quality best management practice (BMP) capital projects will need to be constructed and 'co-benefits' that increase the cost-benefit beyond the cost per pound of pollutant (phosphorus) will not be created. However, urban stream restoration still has the greatest cost-benefit of cost per pound of phosphorus. To put it into perspective, the cost-benefit for each of the regional pond retrofits is $26,500/lb. Other BMPs such as bioretention filters and sand filters are about $55,000 - $75,000/lb. Alternatively, urban stream restoration projects in the City should cost about $5,000 - $15,000/lb. However, since these projects currently have secured matching SLAF grant funding, the City's cost is about $2,500 - $7,500/lb. The Taylor Run Stream Restoration project is slated to remove 300 pounds of phosphorus at a cost of $4.5M, with the City's match of the SLAF grant being $2.25M. Notwithstanding issues arising from constructability, foregoing the Taylor Run project

would require construction and design of approximately 300 bioretention filters as retrofits on public property and rights-of-way at an estimated cost of roughly $20M.

16. What environmental permits are required for this project?

a. The process in Virginia is through a Joint Permit Application (JPA), managed by Virginia Marine Resources Commission (VMRC), that conveys permit requests to Virginia Department of Environmental Quality (VA DEQ) and the US Army Corps of Engineers (USACE). These agencies then determine their jurisdiction over the resources in the project area and issue or deny permits. Application for the three permits are required for compliance with state and federal environmental regulations. Copies of all required environmental permits will be available soon here: Stream Restoration

17. Can the City "restore" streams on private property?

a. The City may use private property for any reasonable purpose, such as to construct any infrastructure necessary or required for meeting goals identified as to the public interest, as long as the private property owner(s) authorize such use and grant an easement dedicated to the City that is recorded in land records and runs with the land.

18. Was Recreation, Parks, and Cultural Activities (RPCA) Natural Resources Division (NRD) consulted on these Stream Restoration projects?

a. RPCA's Natural Resources Division is a critical Stakeholder in all of the City's Stream Restoration projects. Especially, due to the fact that most of the proposed stream projects occur on public property managed by RPCA and NRD, and their support is required for the future success of these projects. NRD and their staff have been integral partners in the design and approach for each stream project and have been involved with the design process from the beginning.

19. Shouldn't the City be considering a "Do No Harm" approach to Stream Restoration projects?

a. "Do No Harm" implies that there would be no harm in doing nothing. In the case of Stream Restoration on a degraded stream, particularly for Taylor Run, there is considerable risk of continued harm occurring if nothing is done to stabilize the stream banks and bed.
    i. Erosion of the banks will continue, sending sediment and associated pollutants downstream and ultimately into the Bay.
    ii. Erosion of the banks will continue, resulting in premature tree loss.
    iii. Erosion of the banks and bed will continue, threatening the sanitary sewer that runs along, through and across the stream, potentially leading to failure and raw sewage entering the stream.

iv. The City will not be able to efficiently obtain pollution reduction credits, up to 30% of the total TMDL for Phosphorous, and will risk having to spend considerable additional funding to meet pollution reduction mandates. This could lead to an increase in property taxes for residents.

20. How long will it take before things grow back?

a. Typically, the grasses and shrubs establish within a year, or one growing season. The overstory trees will be also be established after one growing season, but will need care and maintenance for several years to ensure survivability. Below is a recent example of how quickly grasses and shrubs return after a stream restoration project. This is Pike Branch Tributary in Ridgeview Park in Fairfax County after one year from planting. The photos were taken August 2020 (courtesy: Resource Environmental Solutions, LLC).